Artificial Augmentation of Latent Heat Coefficient in Ferromagnetic Crystals for Enhanced High-Temperature Ferromagnetic Effects

17 July 2025
Simon Edwards
Research Acceleration Initiative

Introduction

A major challenge being faced by researchers interested in overcoming the thermal limitations on the performance of permanent magnets is one of how to create magnets which are both affordable and which do not lose their property of ferromagnetism when temperatures exceed a certain threshold. Neodymium-Praseodymium Oxide is known for its ability to continue to project magnetism even at such high temperatures as those which can exist in aviation application, but this is a rare material currently valued at $110 per kilogram.

Abstract

It is important to, first, understand exactly what goes on at the sub-atomic level to prompt ferromagnetism in the first place is one wishes to create solutions to this type of problem. I have written multiple papers on this topic, sc. 15 June 2022, in which I explain that it is not a coincidence that the ferromagnetic elements (26, 27 and 28) are neighbors on the periodic table. I explain in that publication that the spatial relationships between protons in iron, cobalt and nickel relative to the position of shell one electrons creates a dynamic between the protons and electrons which induces spin in the nucleus. This spin (which could be termed a form of latent heat and with nuclear spin being the basis of latent heat, as I explain in my publication of 9 January 2025,) is essential to allowing the electrons to maintain a consistent spin orientation after being initially magnetized. Changes to the relative position of the nucleus associated with high temperatures disrupt the ferromagnetic property both by repeatedly increasing decreasing the distance between nucleus and shell 1 of the electron cloud and by causing the spin speed of the nucleus to decrease. Feedback effects from the electrons, cause the spin inertia (i.e. latent heat) of the nucleus to be reduced when the thermal threshold is exceeded.

That said, if the spin velocity of a nucleus of a ferromagnetic material may be artificially increased and its tendency to convert thermal energy into axis spin may be enhanced, it may retain its ferromagnetic property at far higher temperatures. I propose that the crystalline structure of PrNd oxide combined with a particular alignment of the relative position of praseodymium and neodymium result in enhanced spin in much the same way that Coulomb effects generated by the dynamic between standard ferromagnetic materials and its own electrons will generate these effects. Whereas this spin-enhancing effect in [26, 27 and 28] is entirely intra-atomic, in PrNd oxides, it is molecular in scale. Although still attributable to Coulomb effects, it is mutual repulsion of like positive charges in protons rather than the attraction of dissimilar charges which is responsible, with the forces being projected over greater distances due to the crystalline structure. If the praseodymium

and neodymium were in perfect alignment, this spin-enhancement effect would not be observed. I propose that; particularly in the presence of heat; PrNd oxide-based materials tend to very slightly twist within the context of their lattice i.e. the lattice is not entirely rigid. This causes the edge of the nucleus of one molecule to align with the edge of another, but rarely for the two to squarely align. The variability in alignment would be on the order of 1-3Å and has likely not been discovered.

With this understanding, it should be possible to develop an iron-cobalt compound with a crystalline structure which would benefit both from intra-atomic spin-enhancement effects innate to those materials as well as additional enhancement by the molecular-level effects brought on by the fluxing lattice. *Although the basis of ferromagnetism is nuclear spin, it is significant that [26, 27, and 28] ferromagnetism and [59 and 60] ferromagnetism are brought on through manifestations of Coulomb effects which are distinct in terms of their nature and their range.*

One approach which may be worth exploring would be the precision doping of and iron-cobalt lattice with hydrogen in order to create force lines which have as their focal point to opposing sides of a given nucleus (visualize this as holding a basketball in one's hands with the right hand on top and the left hand on bottom and then abruptly moving one's right hand to the right and the left hand to the left, relinquishing control over the ball.) Just as a basketball would begin to rapidly spin under this condition, so would atoms of iron or cobalt in a lattice featuring the appropriate hydrogen doping.

Conclusion

Provided that ferromagnetic materials may be manufactured with a crystalline structure and provided this hydrogen doping, such a material should continue to exhibit ferromagnetic characteristics well beyond the standard limits, allowing the material's use in the aforementioned aviation applications. This material would be incredibly unique in that it would exploit both the intra-atomic Positive-Negative Coulomb effects responsible for nuclear spin associated with ferromagnetism *as well as* molecular-level, longer range effects associated with Positive-Positive Coulomb effects. Natural materials would, importantly, never feature both attributes, but an artificial material may be made to derive its ferromagnetic properties from *both* effects.